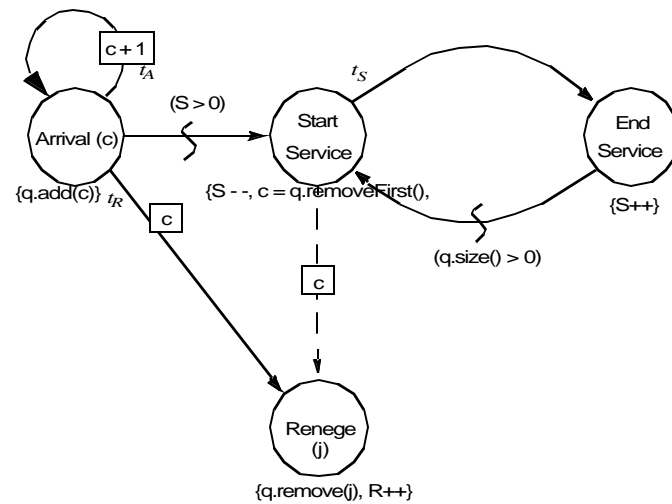OA 3302
Winter 2003
Sample Midterm

1.   Consider the following Event Graph:

At time 19.5, the simulation is in the following state

$S = 0$

$q = \{14, 15, 17\}$

$R = 4$

The next few values of the random variates are:

$t_A = \{2.7, 4.1, ...\}$

$t_S = \{3.6, 3.7, ...\}$

$t_R = \{3.2, 5.1, ...\}$

Simulate this model by hand, showing the Event List and the state values, until the Arrival (20) event occurs starting from an Event List as follows:

20.1	Renege (15)
20.7	End Service
22.6	Renege (14)
23.2	Arrival (20)
24.6	Renege (17)
25.1	End Service

2. Formulate the following as an Event Graph model. Be sure to define your parameters and state variables. The desire measures to be estimated are the average number in the queue for each type of customer and the average overall utilizations for the servers.

   Two types of customers arrive to a service facility that consists of several identical servers. Each type of customer arrives according to an independent arrival process having a different interarrival time distribution and they also have different service time distrributions. Type 1 customers are served by one server, but type 2 customers require two servers simultaneously. An arriving type 2 customer that finds a server unavailable must wait until two are simultaneously free. In that case, the one available server is free to serve any arriving type 1 customers. However, priority is given to type 2 customers if two or more servers are available and both types of customers are waiting.

3. Consider the following Event Graph:
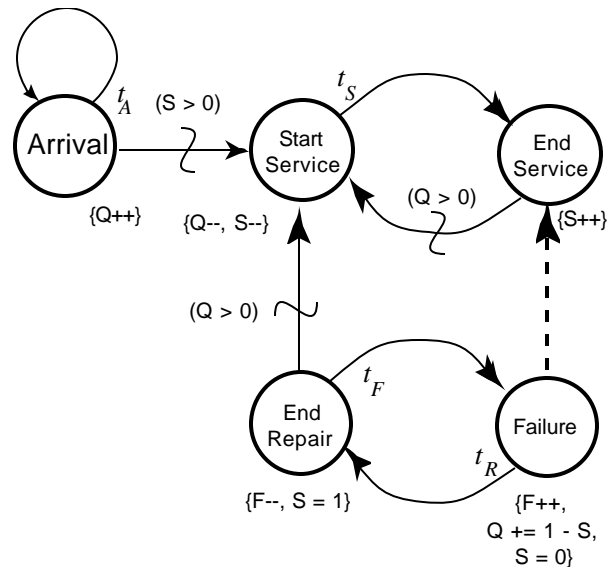
Write the Simkit code for the events Arrival, Failure, and End Repair only. Assume that integer state variables called `numberInQueue`, `numberAvailableServers`, and `machineFailed` have been defined for the states Q, S, and F, respectively (so you don't have to define them). Give the declaration for any other variables you use. Do not write the constructor. Include `firePropertyChange()` methods as appropritate.

4.) At time 3.0 a unit located at (-10.0 km, 20.0 km) starts moving to destination (70.0 km, 60.0 km) at speed 40 km per hr. A stationary sensor with range 20 km is located at (50.0 km, 30.0 km).
   a. At what time (if any) will the target enter the range of the sensor?
   b. What is the (absolute) location of the target when it enters the range of the sensor?